

(Reprinted from the ***Timberline*** - Wisconsin DNR – Division of Forestry internal staff newsletter
- 1st quarter 2003 issue.)

Eastern White Pine Tree Improvement Efforts in Wisconsin

By David Stevens and Greg Edge

Eastern white pine (*Pinus strobus*) is the largest native Wisconsin tree species, with the ability to grow over 200' tall and live up to 500 years. It was once a major component of northern Wisconsin's forests, as well as some forests of southern Wisconsin such as the Kickapoo River Valley and the Baraboo Hills. For many it still symbolizes the "north woods". White pine became the first tree species to be exploited by the European settlers. In his book Empire in Pine, Robert Fries notes that "in the early years of the industry only white pine interested the lumbermen of Wisconsin. Light and easily workable, it was an ideal wood for all building purposes and was easily transportable by water." Fueled by the rapid development of the great prairies of Illinois, Iowa and Southern Wisconsin lumber activities quickly surpassed mining and fur trading as the state's top business. According to Fries, cutting started in earnest around 1840 and reached a high of over four billion board feet in 1892. By 1910 the majority of Wisconsin's white pine had been cut and much of what remained was destroyed by wildfires or converted to agriculture.

Early reforestation efforts focused on red pine due to its high productivity under plantation culture, desirable form and relatively low insect and disease problems. While the state nurseries currently produce about three million white pine seedlings per year, red pine production has traditionally been two to five times higher. Concern over the species' susceptibility to white pine blister rust (*Cronartium ribicola* Fisch.) and white pine weevil (*Pissodes strobi* Peck) has resulted in a lower frequency of white pine plantings. Renewed interest in the species has been steadily growing, however. Where as red pine is known to have little genetic variation, white pine has been found to be much more genetically diverse. The potential for increased height and volume growth, greater insect and disease resistance and improved form characteristics has been known for some time. Currently, however, little is empirically known about Wisconsin white pine seed sources, making recommendations on seed collection areas and plant distribution within the state difficult to judge.

Wisconsin's past white pine tree improvement efforts have focused in two areas. The Division of Forestry has worked cooperatively with the USDA Forest Service's white pine blister rust research program at the Oconto River Seed Orchard for twenty years. During that time grafts of putative blister rust -resistant eastern white pine were obtained from Forest Service collections and used to establish a ten-acre clonal seed orchard at the Sawyer Creek Fishery Area in Washburn County. Increasing quantities of seed have been collected annually from this orchard for use in the state nurseries. More than 200 bushels of cones were collected in 2002. The second area of research has been the establishment of a southern Appalachian seed source trial. Southern Appalachian seed sources have proven to be faster growing than local sources in many areas of the country. Results of the Wisconsin trial indicate that southern Appalachian seed sources do not exhibit superior growth over local sources except in southwest Wisconsin.

The Division of Forestry and the U.W.-Madison Department of Forest Ecology and Management have begun a genetic evaluation and improvement effort to better understand basic genetic information on the extent and patterning of variation in Wisconsin's remaining white pine populations and to provide a source of improved seed for the state nurseries. Open pollinated seeds from 234 trees representing 50 natural stands of eastern white pine were collected across

Wisconsin during 1996, 1998 and 2000. In addition, Dr. Richard Meier (USDA-Forest Service, R-9) provided seed from 142 USDA-Forest Service selections made in the Upper Peninsula of Michigan, Minnesota and Wisconsin (Figure 1). Unfortunately not all cone collections produced enough viable seed to be included in the trial. Starting in 1999, two sets of seedlings, each a year apart, were propagated and grown for one year at the UW-Madison Walnut Street greenhouses. The seedlings were out-planted at the Wilson State Nursery and allowed to grow for another year. In the spring of 2002, the first set was lifted and planted on a 14-acre site on the NHAL State Forest near Lake Tomahawk, Wisconsin. This northern Wisconsin trial consists of 256 families, planted in 4 tree plots and replicated in 10 blocks. A second “southern” trial will be planted in the Black River State Forest in the spring of 2003. A ten-acre site was identified this year and site preparation including herbicide application and disking was performed over the summer.

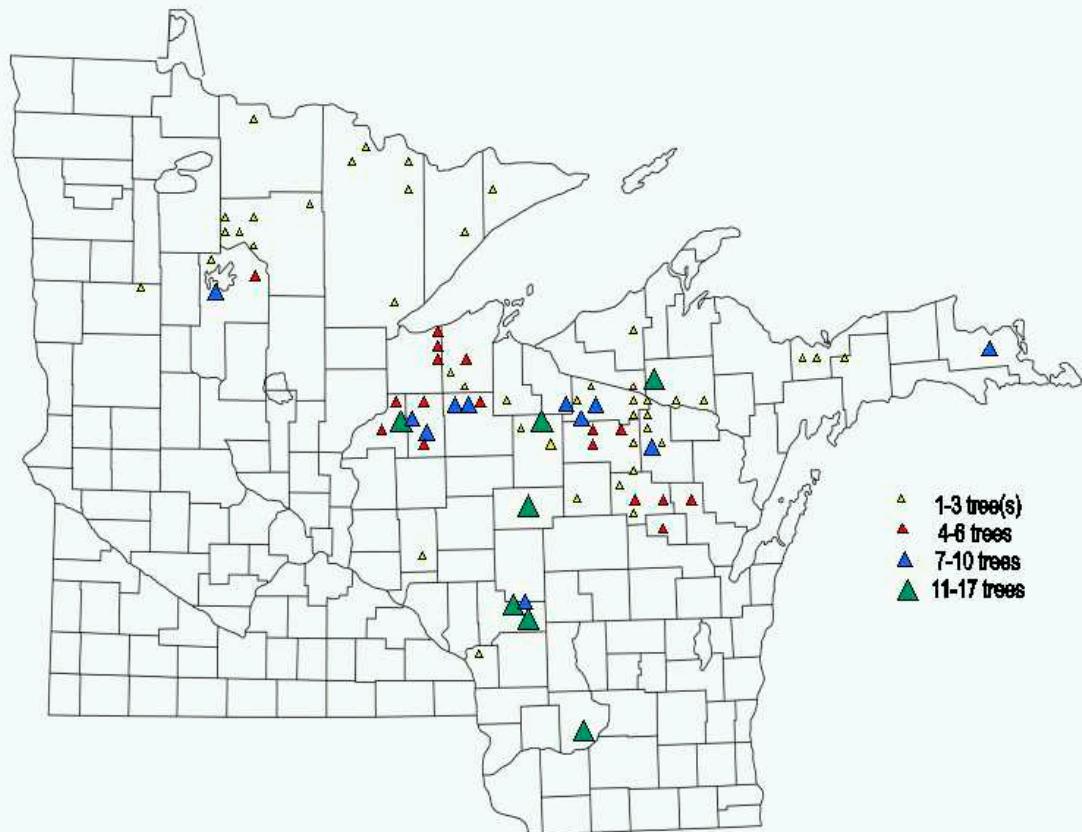


Figure 1: Origin of white pine selections. Symbols represent the relative number of trees selected from each stand.

Growth rate, disease resistance and form characteristics will be evaluated over the next 15-20 years to determine the extent and pattern of genetic variation within these regional white pine populations. The short-term benefit of this research will be the identification of white pine seed sources appropriate for use in the state nurseries. The northern and southern orchard design will allow for a close examination of latitude effects on family performance. The long-term benefits will be the development of two seedling seed orchards for future seed production and genetic resource conservation of Lake States white pine.

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